

UNITED STATES PATENT OFFICE.

GEORGE W. MILES, OF BELMONT, MASSACHUSETTS.

METHOD OF TREATING PAPER WITH A PARAFFIN.

1,367,274.

Specification of Letters Patent.

Patented Feb. 1, 1921.

No Drawing.

Application filed February 4, 1915. Serial No. 6,062.

To all whom it may concern:

Be it known that I, GEORGE W. MILES, citizen of the United States, and resident of Belmont, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Methods of Treating Paper with a Paraffin, of which the following is a specification.

My invention relates to the manufacture of water-resistant paper, and consists of a method by which paper may be given any desired degree of paraffin finish within a wide range of proportionate incorporation of a paraffin in the paper. My invention is characterized by the application of a paraffin to the paper fiber in the form of an emulsion, which may be given any desired degree of dilution or extension, so as to produce any desired degree of paraffin finish in the final product. The use of a paraffin emulsion enables the manufacturer to introduce the paraffin at any stage of the paper manufacture, from fiber in the beater to the fully formed paper web, and also eliminates the necessity for putting the paper through a distinctly separate paraffining process, such as is now practised.

A paraffin wax can be emulsified in water by a method which I have invented and which forms the subject matter of Letters Patent of the United States, No. 1,168,534, dated January 18, 1916. Briefly stated, this process of emulsifying a paraffin wax consists in melting the wax in mixture with a soap paste composed of a soap and an amount of water not materially exceeding a critical maximum proportion, to be ascertained empirically according to the character of the soap employed.

More particularly, as a specific example of the paraffin wax emulsifying process; take an ordinary soda-tallow soap, make a paste of the soap in three or four times its weight of water, and beat this paste with melted paraffin wax, maintaining the temperature at the boiling point of water.

In this instance, the proportion of paraffin wax to soap (dry) may be ninety-five to five, though larger percentages of soap may be used. The quantity of water above specified is larger than the critical quantity required to effect the emulsification of the paraffin wax. By continued boiling, the excess of water is driven off until the critical proportion remains behind, when the paraffin wax goes into emulsion. The emulsion

thus prepared may be diluted or extended with water, as desired.

Other waxes or waxy materials, such as carnauba wax, stearin, or Japan wax, may be emulsified in the ordinary way, and may be mixed with paraffin wax emulsions, if desired.

A paraffin wax emulsion, formed as above indicated, can with advantage be introduced into the beater with the fiber. In order to correct any hardness of the water, it is desirable to introduce rosin soap, or its equivalent for such purposes, into the beater before introducing the paraffin wax emulsion. When the emulsion has been thoroughly incorporated with the fiber, a suitable precipitant, such as alum, is added. The precipitant not only breaks up the wax emulsion, but also precipitates the size—such as rosin soap—upon the fibers. This simultaneous precipitation deposits the wax particles with the size upon the fibers, which thereafter carry both size and wax into the body of the paper web.

Other sizing materials, such as glue or starch, may be used, or may be mixed with the rosin size.

The characteristic of a true paraffin wax emulsion such as made by treating paraffin wax by the method above described, is that the paraffin exists in the emulsion in the form of very finely divided, suspended, solid particles of paraffin, each of which possesses the physical properties peculiar to a solid paraffin. This condition is distinguished from one in which paraffin having been associated with other substances, such as oils, has become liquid or viscous, possesses a melting point considerably lower than that of paraffin in its essentially pure or natural condition, and is therefore no longer waxy or like paraffin in the true sense of the word.

The finely divided paraffin is thus distributed through and incorporated with the fiber of which the paper is subsequently made. More or less paraffin can be thus incorporated with the fiber simply by variation of the proportions or strength of the paraffin wax emulsion introduced into the paper stock. For some purposes, distribution of the paraffin wax, in emulsion, among the paper fibers before these are actually aggregated to form the paper web, is to be preferred to the more superficial addition of a paraffin wax to the paper after the web is formed. By introducing the emulsion

into the beater, for example, each fiber becomes paraffin-treated and the paraffin is more thoroughly distributed through the body of the paper than it can be when the wax is applied to the formed web. Calendering of a paper, the individual fibers of which have received a paraffin treatment, will bring out the characteristic superficial waxy finish.

In many cases, however, it will suit the requirements of the paper manufacturer to apply a paraffin wax to the formed paper web, even after the wax has been incorporated in the structure by the specific mode above described. A paraffin wax emulsion may be brushed or sprayed on to the paper web, either when the latter is still wet, or after it has been dried. If desired, suitable sizing material, such as casein, glue, or starch, may advantageously be mixed with the paraffin wax emulsion. Or, the paper may be passed through a bath of the emulsion. Unlike the method of applying melted paraffin, either by brushing or immersion, the emulsion method is susceptible of accurate control. The quantity of wax per pound of paper can be readily determined, and widely varied, simply by variations in the dilution of the emulsion, or of the rate at which it is brushed or sprayed, or of the rate at which the paper web is passed through it, or of the length of paper immersed in a bath of the emulsion. Calendering of the paper, after a paraffin wax coating by emulsion, will complete the desired finish. Or, if the paper is simply dried, it will possess water-resistant qualities and a relatively dull finish.

I claim:

1. The method of producing water-resistant paper, which consists in applying to the fibrous material of the paper an emulsion of paraffin wax, depositing upon the

fibrous material, from said emulsion, minute solid particles of the said wax.

2. The method of producing water-resistant paper, which consists in applying to the fibrous material of the paper an emulsion of paraffin wax, depositing upon the fibrous material from said emulsion, minute solid particles of the said wax, and subsequently compacting the waxed fibrous material, as by calendering.

3. The method of treating paper stock for the production of water-resistant paper, which consists in applying to the fibrous material of the paper, at a stage in advance of the formation of the paper web, an emulsion of paraffin wax, depositing upon the fibrous material from said emulsion, minute solid particles of the said wax.

4. The method of treating paper stock for the production of water-resistant paper, which consists in introducing an emulsion of paraffin wax into the fibrous material while in the beater, incorporating solid particles of the said wax with said fibrous material and eventually into the paper web.

5. The method of treating paper stock, which consists in introducing an emulsion of solid particles of unmodified paraffin wax with a size into the water vehicle in which the paper fiber is distributed at a stage in the progress of the fiber in advance of formation of the paper web, thereafter precipitating the size on the fiber with the paraffin wax, thus incorporating the paraffin wax with the fiber and finally into the paper web.

Signed by me at Boston, Massachusetts, this thirtieth day of January, 1915.

GEORGE W. MILES.

Witnesses:

JOSEPHINE H. RYAN,
RICHARD W. HALL.